

## **STCG SUBCON SUBGROUP MEETING**

August 21, 1997

### **Phytoremediation of Carbon Tetrachloride in the 200-West Area (Dr. Lee Newman and Dr. Stuart Strand, University of Washington)**

Phytoremediation is the use of plants to take up and destroy or sequester pollutants. Many types of phytoremediation exist. Some remove metals from soil or groundwater. Others stabilize contaminated landfills, excrete nutrients through plant roots for bioremediation, or purify the air. The plant roots lift contaminants out and degrade them. Some of the advantages of phytoremediation are:

- the plant roots go deep
- they seek out groundwater
- it is inexpensive
- it is easily applied
- it is low-maintenance
- it is attractive
- the plants absorb and sequester pollutants.

Mainly poplar trees are used for phytoremediation because they are fast-growing and considerable data/knowledge exists about them.

The University of Washington constructed 12 cells in Fife, Washington, just East of Tacoma. The cells are 20 feet by 12 feet by 4.5 feet, with injection and extraction wells, and are lined with high-density polyethylene. Fifteen poplar trees were planted in each cell. They grew 12 feet in one season, and 27 feet in two seasons. Water with 15 PPM trichloroethylene (TCE) was injected into the cells, and 98% was removed by the trees. No carbon tetrachloride was emitted to the atmosphere via the leaves. Dr. Newman believes that the plants are dechlorinating the TCE.

For application of phytoremediation at Hanford, Dr. Newman recommends planting upstream of the contaminated aquifer and doing subsurface drip irrigation onto the tree roots. The technology will take contaminants out of the soil within the range of the roots (but not down to 200 feet). The root depth is estimated to be 25 feet for full-grown poplars, and the trees have a 20-30 year lifespan. Dr. Newman is looking for suggested potential demonstration sites at Hanford (e.g., the strontium and chromium plumes in the 100 Area). Other researchers are looking at strontium and chromium remediation using sunflowers.

In the year 2000, DOE must re-evaluate the pump-and-treat operations on the Site. First they will do paper studies of alternatives, then feasibility tests. Ecology is in favor of evaluating soil flushing in an area near the river, not for the cribs, but EPA does not favor this.

### Groundwater Project FY98 Technology Needs (Tony Knepp)

Tony Knepp summarized the Groundwater Project's nine high-priority technology needs for FY98, which deal with detection and remediation of carbon tetrachloride, chromium, and strontium plumes in groundwater on the Hanford Site. DOE, EPA, and Ecology have a strategic agreement to focus on the carbon tetrachloride, chromium, and strontium plumes. The tritium and nitrate plumes are lower priority and will be left until a later date. The big problem at Hanford is that it's 200 feet to the groundwater. The groundwater technology needs identified by the Hanford ER Program represent the desire to obtain more effective ways of doing what the program is already doing.

Barbara Harper requested that the Subgroup include a back-up list of lower-priority technology needs using the narratives for the old groundwater remediation technology needs from previous years. Tony agreed to develop a one-page table showing all the other plumes at Hanford (e.g., tritium, nitrates, iodine).

### Remedial Action/Waste Disposal Project FY98 Technology Needs (Walter Remsen)

Kim Kogler summarized the Remedial Action/Waste Disposal Project's 11 high-priority technology needs for FY98. Walter Remsen was there to clarify issues and answer questions. The FY98 needs include detection and delineation of burial grounds, in situ characterization and remediation of heavy metals and radionuclides, real-time field screening of heavy metals and radionuclides, long-life waste isolation surface barrier, improved handling and segregation of TRU waste and debris, and improved detection and handling of pyrophoric materials in burial grounds. Another need will be included for in situ detection and characterization of contaminants in the vadose zone under the tanks. This need will be jointly written by the Tanks and Subcon Subgroups.

Again, Barbara Harper requested that the Subgroup include a back-up list of lower-priority technology needs using the narratives for the old remedial action technology needs from previous years. Kim agreed to develop a table of lower-priority needs.

Dennis Faulk asked the facilitator to send a message to all the STCG Subgroup Leads asking that the long-life waste isolation surface barrier be added to their technology needs packages, since it is (or will be) a technology need for all the Hanford programs. Dennis wants to impress all the Focus Areas and the Hanford STCG Management Council with the breadth of applicability of the technology to increase its likelihood of getting funded.

### Barriers to Technology Deployment

Dave Olson raised the issue of barriers to deploying technologies in the field, such as the elaborate treatability test plans that are required. It was suggested that we need to understand where the system has failed and what are the root causes. It seems that

we are not set up to get new technologies implemented. Gary Ballew agreed to work with Dave on this issue, and it will be included on a future Subgroup meeting agenda.

### Action Items

1. Kim Koegler will get the draft needs statements from the project managers by August 31 and distribute them to the Subgroup members by September 8. The drafts must go to the Management Council on September 17 for their review.
2. The facilitator will send a message to all the STCG Subgroup Leads asking that the long-life waste isolation surface barrier be added to their technology needs packages, since it is (or will be) a technology need for all the Hanford programs.

### Next Meeting

The next meeting will be held on September 24, 1997 in the Bechtel Building. The specific location and agenda will be distributed prior to the meeting.

### Attendees

Larry Bagaasen (PNNL)  
Gary Ballew (Pacific Rim Enterprise Center)  
Dave Biancosino (DOE-RL)  
Linda Fassbender (PNNL)  
Dennis Faulk (EPA)  
Dib Goswami (Ecology)  
Barbara Harper (YIN)  
Tony Knepp (BHI)  
Kim Koegler (BHI)  
Wayne Martin (PNNL)  
Jay McConnaughey (WDFW)  
Lee Newman (UW)  
David Olson (DOE-RL)  
Shirley Rawson (PNNL)  
Walter Remsen (BHI)  
Fred Serier (DOE-RL)  
Stuart Strand (UW)  
Nancy Uziemblo (Ecology)